STATE OF SOUTH CAROLINA

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of: Annual Review of Base Rates for Fuel Costs of Dominion Energy, South Carolina, Inc.	)	**DOCKET NO. 2021-2-E**

DIRECT TESTIMONY AND EXHIBITS OF

R. THOMAS BEACH

ON BEHALF OF

THE SOUTH CAROLINA COASTAL CONSERVATION LEAGUE and SOUTHERN ALLIANCE FOR CLEAN ENERGY

March 16, 2021

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EXHIBITS

Exhibit RTB-1 – Resume of R. Thomas Beach, Crossborder Energy

Exhibit RTB-2 – Rebuttal Testimony of R. Thomas Beach in Docket No. 2019-182-E

Exhibit RTB-3 – NEM Methodology adopted in Order No. 2015-194 in Docket No. 2014-246-E

I. INTRODUCTION AND QUALIFICATIONS

Q: PLEASE STATE FOR THE RECORD YOUR NAME, POSITION, AND BUSINESS ADDRESS.

A: My name is R. Thomas Beach. I am principal consultant of the consulting firm Crossborder Energy. My business address is 2560 Ninth Street, Suite 213A, Berkeley, California 94710.

Q: PLEASE DESCRIBE YOUR EXPERIENCE AND QUALIFICATIONS.

A: My experience and qualifications are described in the attached curriculum vitae (CV), which is **Exhibit RTB-1** to this testimony. As reflected in my CV, I have more than 35 years of experience on resource planning, rate design, and ratemaking issues for natural gas and electric utilities. I began my career in 1981 on the staff at the California Public Utility Commission ("CPUC"), working on the implementation of the Public Utilities Regulatory Policies Act, on the restructuring of California's natural gas industry, and as an advisor to three commissioners. Since leaving the CPUC in 1989, I have had a private consulting practice on energy issues and have appeared, testified, or submitted comments, studies, or reports on numerous occasions before the state energy regulatory commissions in many states. My CV includes a list of the formal testimony that I have sponsored in state regulatory proceedings concerning electric and gas utilities.

Q: PLEASE DESCRIBE MORE SPECIFICALLY YOUR EXPERIENCE ON AVOIDED COSTS AND ISSUES RELATED TO NET ENERGY METERING AND THE COST-EFFECTIVENESS OF RENEWABLE DISTRIBUTED GENERATION AND OTHER TYPES OF DISTRIBUTED ENERGY RESOURCES.

A: I have worked on issues concerning the calculation of avoided cost prices throughout my career, including sponsoring testimony on avoided cost issues in state regulatory proceedings in Oregon, California, Idaho, Montana, Nevada, New

Hampshire, North Carolina, and Vermont. With respect to benefit-cost issues concerning renewable distributed generation (DG), I have sponsored testimony on net energy metering (NEM) and solar economics in South Carolina and ten other states. Since 2013, I have co-authored benefit-cost studies of NEM or solar DG in Arkansas, Arizona, California, Colorado, New Hampshire, North Carolina, and South Carolina. I also co-authored the chapter on Distributed Generation Policy in America's Power Plan, a report on emerging energy issues, which was released in 2013 and is designed to provide policymakers with tools (including rate design changes) to address key questions concerning distributed generation resources. Finally, since 2007, I have sponsored testimony on rate design issues concerning solar DG in general rate case proceedings in Arizona, California, Massachusetts, and Texas.

Q: HAVE YOU TESTIFIED BEFORE THIS COMMISSION?

A: Yes. I appeared before this Commission in December 2014, sponsoring testimony in Docket No. 2014-246-E recommending the methodology to use to evaluate NEM in South Carolina, pursuant to Act 236, the predecessor to Act 62. I sponsored testimony on behalf of The Alliance for Solar Choice. This proceeding resulted in Order No. 2015-194, which established the current NEM program. Most recently, I testified in Docket No. 2020-229-E on behalf of South Carolina Coastal Conservation League ("CCL"), Southern Alliance for Clean Energy ("SACE"), Upstate Forever, Vote Solar, the Solar Energy Industries Association, and North Carolina Sustainable Energy Association recommending that the Commission reject Dominion Energy South Carolina's ("DESC") proposed Solar Choice tariff, in part because the underlying methodology under values the benefits of distributed solar.

Q: ON WHOSE BEHALF ARE YOU TESTIFYING IN THIS PROCEEDING?

A: I am testifying on behalf of CCL and SACE.

II. SUMMARY OF TESTIMONY

Q: PLEASE SUMMARIZE YOUR TESTIMONY.

A: This testimony addresses how the value of distributed solar resources should be assessed in this cost recovery proceeding. I recommend using the cost-benefit analysis, previously filed in Docket No. 2019-82-E[1]—attached to this testimony as **Exhibit RTB-2**—to quantify the full slate of benefits and costs of distributed energy resources ("DERs") on the DESC system. This valuation quantifies all of the benefits and costs of distributed solar recognized by the Commission in Order No. 2015-194 and applies the cost-benefit methodology endorsed in the same order.

The first section provides some background by describing the cost-benefit methodology adopted in Order No. 2015-194. This section also observes that all benefits of DERs adopted in that order are quantifiable and that, in the event there is uncertainty about the magnitude of a specific benefit or cost, the default should not be to assign a zero value to that benefit or cost. Instead, the Commission should establish a reasonable value for the benefit or cost based on an examination of several cases that span a range of reasonable values for such a benefit or cost.

The second part of this testimony, with reference to the cost-benefit analysis I conduct in Exhibit RTB-2, explains how I derived a value for distributed solar resources for DESC using the existing methodology set out in Order No. 2015-194. Ultimately, I

[1] Rebuttal Testimony of R. Thomas Beach at 3-23, Generic Docket to (1) Investigate and Determine the Costs and Benefits of the Current Net Energy Metering Program and (2) Establish a Methodology for Calculating the Value of the Energy Produced by Customer-Generators, Docket No. 2019-182-E (Oct. 29, 2020) [hereinafter, "Exhibit RTB-2"].

conclude that the benefits of distributed solar resources outweigh the costs to the DESC system and its ratepayers and recommend that the Commission reject DESC's proposed value of solar.

III. THE COST-BENEFIT METHODOLOGY IN ORDER NO. 2015-194

Q: PLEASE DESCRIBE THE EXISTING METHODOLOGY USED TO VALUE THE GENERATION OUTPUT OF DERS IN SOUTH CAROLINA.

A: The Commission adopted a methodology in Order No. 2015-194 that calculates the net value—i.e. the net benefits—of DER generation to determine the amount of under- or over-recovered revenue from the net metering customer. In the case of under-recovered revenue, utilities may recover the difference, referred to as the "DER NEM Incentive," so that they may continue to offer a net metering customer the 1:1 Rate for gross production.[2] In the case of over-recovered revenue, utilities are directed to calculate the credit, if any, to be applied to a net metering customer.[3]

The methodology set out in Order No. 2015-914 to quantify the net benefits delivered by DERs is based on a "value stack" of costs that the utility will avoid (or incur) as a result of using the renewable DER generation in lieu of other generation sources. These are:

1. Avoided Energy
2. Energy Losses/Line Losses
3. Avoided Capacity
4. Ancillary Services
5. Transmission and Distribution Capacity
6. Avoided Criteria Pollutants
7. Avoided Carbon Dioxide Emission Costs
8. Fuel Hedge
9. Utility Integration & Interconnection Costs

[2] *See* Order No. 2015-194 at 21-22. As the Commission is well aware, this framework for compensating net metering customers applies only to those net metering customers who apply before June 1, 2021. S.C. Code. Ann. § 58-40-20(B).
[3] *Id.*

10. Utility Administration Costs
11. Environmental Costs

The settlement adopted in the order included a narrative description of each of these value components, which I include as **Exhibit RTB-3** to this testimony. Order No. 2015-194 recognized that some of these values might be "placeholders" due to "a lack of capability to accurately quantify a particular category," but that these values would be updated when reasonable quantifications become available.[4]

Q: HOW DOES THIS METHODOLOGY APPLY TO THE PRESENT FUEL COST RECOVERY PROCEEDING?

A: Order No. 2015-914 provides that "the costs and benefits of net metering and the required amount of the DER NEM incentive shall be computed and updated annually coincident in time with the Utility's filing under the fuel clause."[5] Accordingly, the utility's annual fuel proceeding provides the occasion to quantify the net benefits of DERs, including distributed solar.

Q: DO YOU HAVE ANY GENERAL OBSERVATIONS ON THE VALUE STACK OF BENEFITS ADOPTED IN ORDER NO. 2015-194, AND LISTED ABOVE?

A: Yes. All of the categories of benefits and costs in this value stack are quantifiable, and have been quantified in other NEM or distributed generation ("DG") benefit/cost studies. There are well-accepted techniques to perform these calculations, or reasonable values for these costs that can be derived from such studies performed for other utilities. If there is uncertainty about the magnitude of a specific benefit or cost, the default should not be to assign a zero value to that category, but to examine several cases that span a range of reasonable values for this benefit or cost and use that review to establish a

[4] *Id.* at 20.
[5] *Id.* at 22.

reasonable value. For example, although the future regulation and costs for mitigating carbon emissions are uncertain, the IRPs of the South Carolina utilities, including DESC, make clear that reducing future carbon emissions is a significant driver of those plans. Thus, carbon compliance costs are not zero for ratepayers, because the utilities are planning today, and spending money today, to reduce their carbon emissions through the acquisition of new renewable generation and the replacement of older coal plants.

Q: SEVERAL OF THE BENEFITS INCLUDED IN THE VALUE STACK OF BENEFITS ADOPTED IN ORDER NO. 2015-194 – FOR EXAMPLE, AVOIDED CRITERIA POLLUTANTS AND AVOIDED CARBON DIOXIDE EMISSIONS – WILL HAVE SOCIETAL BENEFITS THAT EXTEND BEYOND DIRECT COMPLIANCE COSTS FOR RATEPAYERS. ARE THESE SOCIETAL BENEFITS QUANTIFIABLE?

A: Yes, they are. For example:

- Reductions in **criteria air pollutants** have health benefits that can be quantified using available models such as the U.S. Environmental Protection Agency's COBRA model.
- Damages from the climate-changing impacts of **carbon dioxide emissions** have been modeled by numerous researchers. Societal benefits should include a recent estimate of the amount by which these estimates of climate change damages exceed direct carbon compliance costs.
- Other quantifiable societal benefits include: Avoided Methane Leakage, Land Use Benefits, and Economic Benefits.[6]

[6] For a more extensive discussion of these benefits, *see* Direct Testimony of R. Thomas Beach at 22, Generic Docket to (1) Investigate and Determine the Costs and Benefits of the Current Net Energy Metering Program and (2) Establish a Methodology for Calculating the Value of the Energy Produced by Customer-Generators, Docket No. 2019-182-E (Oct. 8, 2020) (avoided methane leakage and land use benefits) [hereinafter, "Beach Direct Testimony"]; Direct Testimony of Frank Hefner and Justin R. Barnes, Generic Docket to (1) Investigate and Determine the Costs and Benefits of the Current Net Energy Metering

IV. COST-BENEFIT ANALYSIS OF DISTRIBUTED SOLAR RESOURCES IN DESC TERRITORY

Q: PLEASE BRIEFLY EXPLAIN HOW YOU CALCULATED THE NET BENEFITS OF DISTRIBUTED SOLAR RESOURCES IN EXHIBIT RTB-2.

A: I quantified the full slate of costs and benefits of distributed solar on the DESC system, including DESC's direct avoided costs, the utility's lost revenues and net metering customer bill savings, solar integration costs, the levelized costs of energy for distributed solar, and the societal benefits of solar.[7] DESC's direct avoided costs include the following components: Energy, Generation Capacity, Line Losses, Transmission Capacity, Distribution Capacity, Fuel Hedge and GHG Compliance Costs.[8] Each of these components was analyzed over the full 25-year economic life of distributed solar resources to capture all costs and benefits.

I then applied the full set of Standard Practice Manual ("SPM") cost-effectiveness tests to residential solar on the DESC system, including the Participant Test, Ratepayer Impact Measure Test, Utility Cost Test, Total Resource Cost Test, and Societal Cost Test.[9]

I should note that this explanation is only a high level summary of my analysis; the previously filed testimony, attached to this filing as Exhibit RTB-2, sets out the analysis step by step and explains how each component was calculated.

Q: PLEASE SUMMARIZE THE RESULTS OF YOUR COST-BENEFIT ANALYSIS.

Program and (2) Establish a Methodology for Calculating the Value of the Energy Produced by Customer-Generators, Docket No. 2019-182-E (Oct. 8, 2020) (economic benefits).

[7] *See* Exhibit RTB-2 at 3-23.

[8] *Id.* at 3-16.

[9] *See* Beach Direct Testimony at 14-18 (analyzing and comparing the five SPM cost-effectiveness tests).

A: The following Figure ES-1 and Table 1 shows the results under each of the SPM cost-effectiveness tests:

Figure ES-1: *Summary of SPM Test Results*

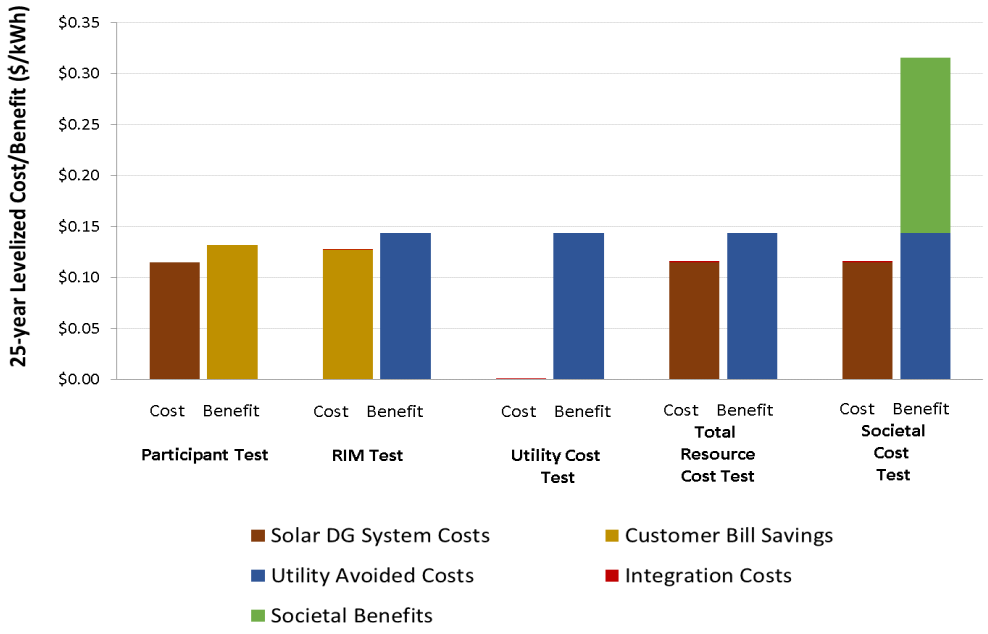

Table 1:

Benefit-Cost SPM Test	**Participant**		**RIM / UCT**		**Total Resource**		**Societal**	
Category	Cost	Benefit	Cost	Benefit	Cost	Benefit	Cost	Benefit
Direct Avoided Costs				0.144		0.144		0.144
Lost Revenues / Bill Savings		0.132 (all solar)	0.127 (exports)					
Integration			0.001		0.001		0.001	
Solar DG LCOE	0.115				0.115		0.115	
Societal Benefits								0.172
Totals	0.115	0.132	0.128	0.144	0.116	0.144	0.116	0.316
Benefit / Cost Ratios	**1.15**		**1.12 (RIM) >>1.00 (UCT)**		**1.24**		**2.72**	

Q: WHAT DO YOU CONCLUDE FROM THESE RESULTS?

A: The value of solar is $0.1428 per kWh, which exceeds the retail rate.[10] Residential distributed solar on the DESC system thus appears to pass all of the SPM cost-effectiveness tests. As a result, there is no difference or "under recovery" of costs by the utility with respect to distributed solar customers. This means that distributed solar is a cost-effective resource for DESC ratepayers and there is no need to impose the NEM portion of the Act 236 DER Incentive Rider on customers. There is also a small net benefit for customers who install solar. Finally, there are significant, quantifiable societal benefits from distributed solar, including public health benefits from reduced air pollution and from mitigating the damages from carbon emissions.[11]

Q: DO YOU CONTINUE TO ENDORSE THE ANALYSIS AND CONCLUSIONS IN EXHIBIT RTB-2?

A: Yes.

Q: PLEASE SUMMARIZE THE KEY ATTRIBUTES OF THE COST-BENEFIT METHODLOGY USED IN YOUR ANALYSIS.

A: I would like to highlight the following three attributes underlying the methodology used in my analysis:

Analyze the benefits and costs from multiple perspectives of the key stakeholders. The best practices for designing benefit-cost analyses of DERs should emphasize consistency with the similar analyses which have become standard practice for all demand-side resources. To provide a framework to analyze these issues in a comprehensive fashion, the utility industry has developed a set of standard cost

[10] Exhibit 2-RTB at 18.

[11] *See* Exhibit 2-RTB at 22-23 for a more thorough discussion of my conclusions.

effectiveness tests for demand-side programs[12] (each of which is referenced in Figure ES-1 and Table 1). These analyses assess the benefits and costs of these resources from multiple perspectives of each of the major stakeholders—the utility system as a whole, participating NEM/DER customers, and other ratepayers—so that the regulator can balance all of these important interests. Examining all of these perspectives is critical if public policy is to support customer choice and equitable competition between DG providers and the monopoly utility.

Consider a comprehensive list of benefits and costs. The location, diversity, and technologies of distributed generation resources require the analysis of a broader set of benefits and costs than, for example, traditional Qualifying Facilities installed under PURPA. Renewable distributed generation projects, principally rooftop solar, produce power in many small (less than 1 MW) installations that are widely distributed across the utility system. The power is produced and consumed on the distribution system; indeed, each net-metered distributed generation project is generally associated with a load at least as large as the DG project's output, which limits the amount of power than is exported to the grid. Further, the exported power is consumed by the DER customer's neighbors, reducing loads on the upstream transmission and distribution system. Accordingly, an analysis of DG benefits should consider the avoided costs for losses and capacity on the transmission and distribution system. Renewable DG also avoids the costs associated with environmental compliance at marginal fossil-fueled power plants. On the cost side, the analysis should consider whether solar or wind DG will result in

[12] *See the California Standard Practice Manual: Economic Analysis of Demand-Side Programs and Projects* (October 2001), available at https://www.raponline.org/knowledgecenter/california-standard-practice-manual/.

new costs to integrate these variable resources. Generally, in my opinion, the methodology adopted in Order No. 2015-194 satisfies this criterion in terms of a comprehensive value stack for most types of DERs, though new types of DERs, such as storage, that offer new benefits such as enhanced reliability and resiliency that should be added to the value stack.

Analyze the benefits and costs in a long-term, lifecycle time frame. The benefits and costs of DG should be calculated over a time frame that corresponds to the useful life of a DG system, which, for solar DG, is 25 to 30 years. This treats solar DG on the same basis as other utility resources, both demand- and supply-side. When a utility assesses the merits of adding a new power plant, or a new energy-efficiency program, the company will look at the costs to build and operate the plant or the program over its useful life, compared to the costs avoided by not operating or building other resource options. The same time frame should be used to assess the benefits and costs of DG.

Failure to consider the costs and benefits of solar may also lead to an undervaluation of distributed solar resources. For example, renewable energy generation provides a long-term hedge against volatile fuel costs for the entire 25-year economic life of, for example, a solar unit. However, calculations of this component underestimate this benefit by focusing on the costs of existing utility hedging programs, which typically only reduce the volatility in short-term fuel and purchased power expenses for the next one to three years. In contrast, there are substantial financial costs to establish a long-term hedge equivalent to what renewable generation provides.[13]

[13] *See* Exhibit RTB-2 at 13-15.

Q: HAS DESC CALCULATED THE VALUE OF SOLAR?

A: Yes. DESC's proposed solar value is $0.03145 (current) and $0.03857 (levelized over 10 years) per kWh.[14]

Q: DO YOU AGREE WITH DESC'S ESTIMATE.

A: No. This estimate is artificially low because DESC has a listed a zero value for several of the "value stack" components that have a real value to the utility, including:

1. Ancillary Services
2. T&D Capacity
3. Avoided Carbon Dioxide Emission Costs
4. Fuel Hedge[15]

Q: HAVE CCL AND SACE PREVIOUSLY PUT FORWARD RECOMMENDATIONS TO THE COMMISSION TO CONSIDER THE BENEFITS OF DERS IN PRIOR FUEL COST DOCKETS?

A: Yes. I have reviewed the testimony of Devi Glick of Synapse Energy Economics, Inc. who provided testimony to the PSC on behalf of CCL and SACE in Docket No. 2019-2-E, which was the fuel cost docket for DESC's predecessor, South Carolina Electric and Gas Company ("SCE&G").[16] In that testimony, witness Glick indicated that he has also provided testimony in the prior year fuel cost proceedings as well.[17]

Q: AT A HIGH LEVEL, WHAT WERE WITNESS GLICK' S CONCLUSIONS AND RECOMMENDATIONS IN THE 2019 FUEL COST PROCEEDING?

A: Witness Glick had several concerns about the methodology used by SCE&G to calculate the avoided capacity value of solar QFs and the failure to provide adequate

[14] Corrected Direct Testimony of Eric Bell at 10, Annual Review of Base Rates for Fuel Costs for Dominion Energy South Carolina, Incorporated, Docket No. 2021-2-E (Mar. 9, 2021).
[15] *Id.* at 10.
[16] Direct Testimony of Devi Glick, Annual Review of Base Rates for Fuel Costs for South Carolina Electric & Gas, Docket No. 2019-2-E (Mar. 19, 2019).
[17] *Id.* at 2.

resource planning that would account for the capacity value of solar. In particular, witness Glick found significant flaws underlying SCE&G's conclusion that solar has zero value for avoided generation capacity.[18]

In addition, witness Glick observed that SCE&G had not fulfilled its requirement "to refine and fill-in values of NEM DER (specifically avoided transmission and distribution—or T&D—capacity, avoided line losses, and avoided environmental costs)." [19]

Q: DID WITNESS GLICK MAKE ANY OBSERVATIONS AOBUT HOW UNDERVALUING DERS AFFECTS SCE&G RATEPAYERS?

A: Yes. Witness Glick noted that the utility's "failure to properly calculate NEM DER categories such as generation capacity, T&D, and environmental costs means that ratepayers [sic] will be charged more as a result of this fuel cost adjustment docket."[20] He called attention to the Act 236 Settlement Agreement, and testified that "a lower Value of NEM DER value creates a higher rate for DER cost recovery (and vice versa). This means that the ratepayers compensate SCE&G for the difference between retail rate and the determined total value of NEM distributed energy resources."[21] As a result, in the event that the Commission approves "an artificially low avoided cost payment, ratepayers will be overcharged."[22]

Q: DO YOU SHARE WITNESS GLICK'S CONCERNS ABOUT RATEPAYERS BEING OVERCHARGED AS A RESULT OF FAILING TO PROPERLY ACCOUNT FOR THE VALUE OF DERS?

[18] *See id.* at 19-20.
[19] *Id.* at 4; *see also id.* at 21-22.
[20] *Id.* at 20.
[21] *Id.*
[22] *Id.*

A: Yes. Though the absolute dollar amount is small given that the Act 236 NEM DER incentive is capped at $1 per month for residential customers,[23] I nevertheless share witness Glick's concern that artificially lowering the value of solar under the established methodology results in overcharging ratepayers. Just as importantly, as I explain below, this artificially low value of solar creates the skewed impression that the utility's existing NEM program creates potential cost-shifts to non-participating customers. This false impression in turn fuels DESC's decision to propose drastic changes in its solar choice tariffs that are pending before this Commission in Docket No. 2020-229-E.

Q: DO YOU HAVE ANY ADDITIONAL OBSERVATIONS ABOUT THE VALUE OF DISTRIBUTED SOLAR IN DESC TERRITORY?

A: Yes. Though I quantify just four categories of societal benefits of distributed solar, including the health benefits of reduced emissions of criteria pollutants, reduced methane leakage, additional benefits of reduced carbon emissions, and land use benefits, there are other societal benefits from distributed solar that are difficult to quantify, but that the Commission should acknowledge and consider qualitatively. Those additional benefits include the following:

- Rooftop solar enhances the **reliability and resiliency** of customers' electric service, because solar DG is a foundational element for backup power systems and micro-grids that can provide uninterrupted power when the utility grid is down.
- Distributed solar also enhances customers' **freedom, choice, and engagement**—allowing them to choose the source of their electricity and to produce much of it themselves on their private property. This results in customers who are more engaged and better informed about how their electricity is supplied.

[23] S.C. Code Ann. § 58-39-150.

- The choice of using private capital to install solar DG on a customer's premises leverages **a new source of capital** to expand South Carolina's clean energy infrastructure and allows the state to take full advantage of federal tax incentives for solar that are scheduled to phase out by 2024.

I would like to reiterate that if there is uncertainty about the magnitude of a specific benefit or cost, the default should not be to assign a zero value to that benefit or cost. Instead, the Commission should trust its expertise and judgment to establish a reasonable value for the benefit or cost based on an examination of several cases that span a range of reasonable values for such a benefit or cost. Continuing to allow the utility to arbitrarily assign a zero value to several of the components of the value stack not only leads to over-recovery of the NEM DER incentive to DESC that is set in this docket, but creates the false impression that there is a future potential cost-shift for solar choice tariffs that are before the Commission in Docket No. 2020-229-E. As I testified in that proceeding, accounting for the full value of solar under the existing, Commission-approved methodology in Order No. 2015-194 eliminates the specter of a cost-shift and supports the conclusion that no radical break from the NEM program is warranted for the solar choice program.

Q: BASED ON THIS ANALYSIS, HOW DO YOU RECOMMEND THE COMMISSION PROCEED IN THIS DOCKET?

A: I recommend that the Commission reject DESC's proposed value of solar, and either 1) accept the value of solar as calculated in Exhibit RTB-2; 2) derive a revised value of solar consistent with the methodology set out above and in Exhibit RTB-2; or 3) require DESC to calculate a revised value of solar consistent with the approach set out above and in Exhibit RTB-2.

V. CONCLUSION

Q: DOES THIS CONCLUDE YOUR TESTIMONY?

A: Yes.

CERTIFICATE OF SERVICE

I hereby certify that the parties listed below have been served with a copy of the *Direct Testimony of R. Thomas Beach* filed on behalf of the South Carolina Coastal Conservation League and Southern Alliance for Clean Energy by electronic mail or by deposit in the U.S. Mail, first-class, postage prepaid.

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This 16 day of March, 2021.

s/ Kate Lee Mixson